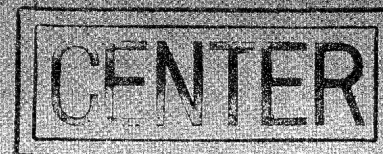


YAMAHA R-50

*Natural Sound AM/FM Stereo Synthesizer Receiver
Yamaha Original Computer Servo Locked Tuning System
10-Station Random-Access Programmable Station Memory
DC NFB PLL Multiplex Demodulator and Pure Pilot Canceller Circuit
Continuously Variable Loudness Control and Bass Extension Function*



OWNER'S MANUAL



Thank you for purchasing the YAMAHA R-50 AM/FM stereo receiver.

CONTENTS

CAUTION: READ THIS BEFORE OPERATING YOUR R-50	1/2
CONNECTION DIAGRAM	3
CONNECTIONS	4/5
FRONT PANEL PARTS AND FUNCTIONS	6/7
LISTENING TO A PROGRAM SOURCE	8
SPECIFICATIONS	9
TROUBLESHOOTING	10

IMPORTANT

Please record the serial number of your unit in the space below.

Model: R-50

Serial No.:

The serial number is located on the rear of the cabinet.
Retain this Owner's Manual in a safe place for future reference.

WARNING

To prevent fire or shock hazard, do not expose this appliance to rain or moisture.

CAUTION (PREPARED IN ACCORDANCE WITH UL STANDARD 1270)

1 Read Instructions — All the safety and operating instructions should be read before the appliance is operated.

2 Retain Instructions — The safety and operating instructions should be retained for future reference.

3 Heed Warnings — All warnings on the appliance and in the operating instructions should be adhered to.

4 Follow Instructions — All operating and other instructions should be followed.

5 Water and Moisture — The appliance should not be used near water -- for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near swimming pool, etc.

6 Carts and Stands — The appliance should be used only with a cart or stand that is recommended by the manufacturer.

7 Wall or Ceiling Mounting — The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.

8 Ventilation — The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.

9 Heat — The appliance should be situated away from heat sources such as radiators, stoves, or other appliances that produce heat.

10 Power Sources — The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.

11 Power-Cord Protection — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.

12 Cleaning — The appliance should be cleaned only as recommended by the manufacturer.

13 Nonuse Periods — The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.

14 Object and Liquid Entry — Care should be taken so that objects do not fall into and liquids not spilled into the inside of the appliance.

15 Damage Requiring Service — The appliance should be serviced by qualified service personnel when:

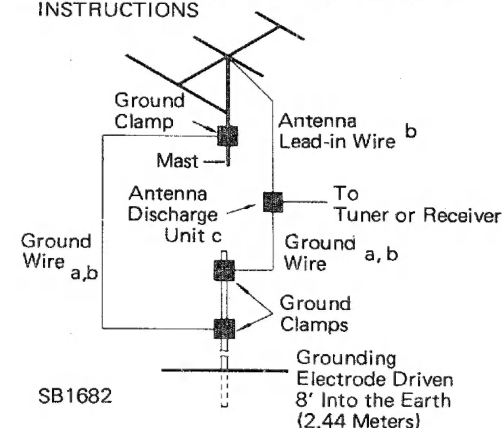
- A. The power-supply cord or the plug has been damaged; or
- B. Objects have fallen, or liquid has been spilled into the appliance; or
- C. The appliance has been exposed to rain; or
- D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
- E. The appliance has been dropped, or the cabinet damaged.

16 Servicing — The user should not attempt to service the appliance beyond those means described in the operating instructions. All other servicing should be referred to qualified service personnel.

17 Power Lines — An outdoor antenna should be located away from power lines.

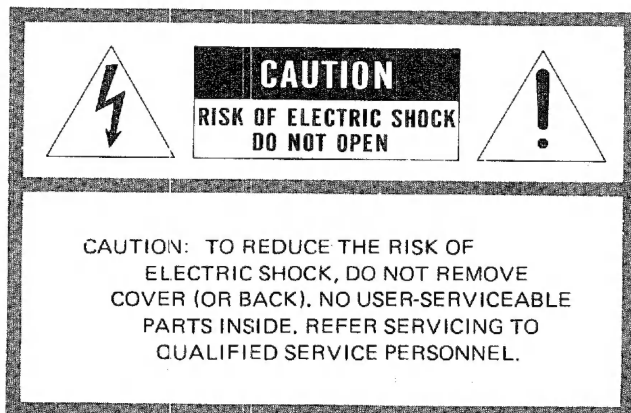
18 Outdoor antenna grounding — If an outside antenna is connected to the tuner, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70 — 1981, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

EXAMPLE OF ANTENNA GROUNDING
AS PER NATIONAL ELECTRICAL CODE
INSTRUCTIONS



- a. Use No. 10 AWG (5.3 mm²) copper, No. 8 AWG (8.4 mm²) aluminium, No. 17 AWG (1.0 mm²) copper-clad steel or bronze wire, or larger, as ground wire.
- b. Secure antenna lead-in and ground wire to house with stand-off insulators spaced from 4 feet (1.22 meters) to 6 feet (1.83 meters) apart.
- c. Mount antenna discharge unit as closely as possible to where lead-in enters house.

CAUTION: READ THIS BEFORE OPERATING YOUR R-50



• Explanation of Graphical Symbols



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

1

The R-50 is a sophisticated stereo receiver. To ensure proper operating for the best possible performance, please read this manual carefully.

2

Choose the installation of your R-50 carefully. Avoid placing it in direct sunlight or close to a source of heat. Also avoid locations subject to vibration and excessive dust, heat, cold or moisture. Keep away from such sources of hum as transformers or motors.

3

To ensure that the unit operates properly, be sure to set it on a level surface, and do not cover the heat vents on the top.

4

If speaker impedance is too low or the temperature becomes too high, a temperature protector cuts off the power. Wait for the unit to cool down or change the impedance, and the unit will operate normally.

5

Use only the supplied AM loop antenna in the AM antenna terminal.

6

The back-up power supply will keep the preset stations memorized for about three weeks if power fails or the set is unplugged. In order to keep the back-up power supply fully charged, turn the power switch on once a week even if you are not using the unit.

Even if the preset stations are erased, the memory is still functional; merely preset the stations again.

7

Do not open the cabinet as this might result in damage to the set or electrical shock. If a foreign object should get into the set, contact your dealer.

8

Do not place records or other objects on top of the receiver so that the ventilation holes are blocked. This will cause the internal temperature to rise and may result in a failure.

9

When removing the power plug from the wall outlet, always pull directly on the plug; never yank the cord.

10

To prevent lightning damage, pull out the power cord and remove the antenna cable in case of an electrical storm.

11

Do not use force when using the switches and knobs.

12

When moving the set be sure to first pull out the power plug and remove cords connecting to other equipment.

13

Always set the volume control to "0" while lowering the tonearm to play a record, then turn the volume up after the stylus is seated in the record groove.

14

Do not attempt to clean the R-50 with chemical solvents as this might damage the finish. Use a clean, dry cloth.

15

Do not connect audio equipment to the AC outlets on the rear panel if that equipment requires more power than the outlets are rated to provide.

16

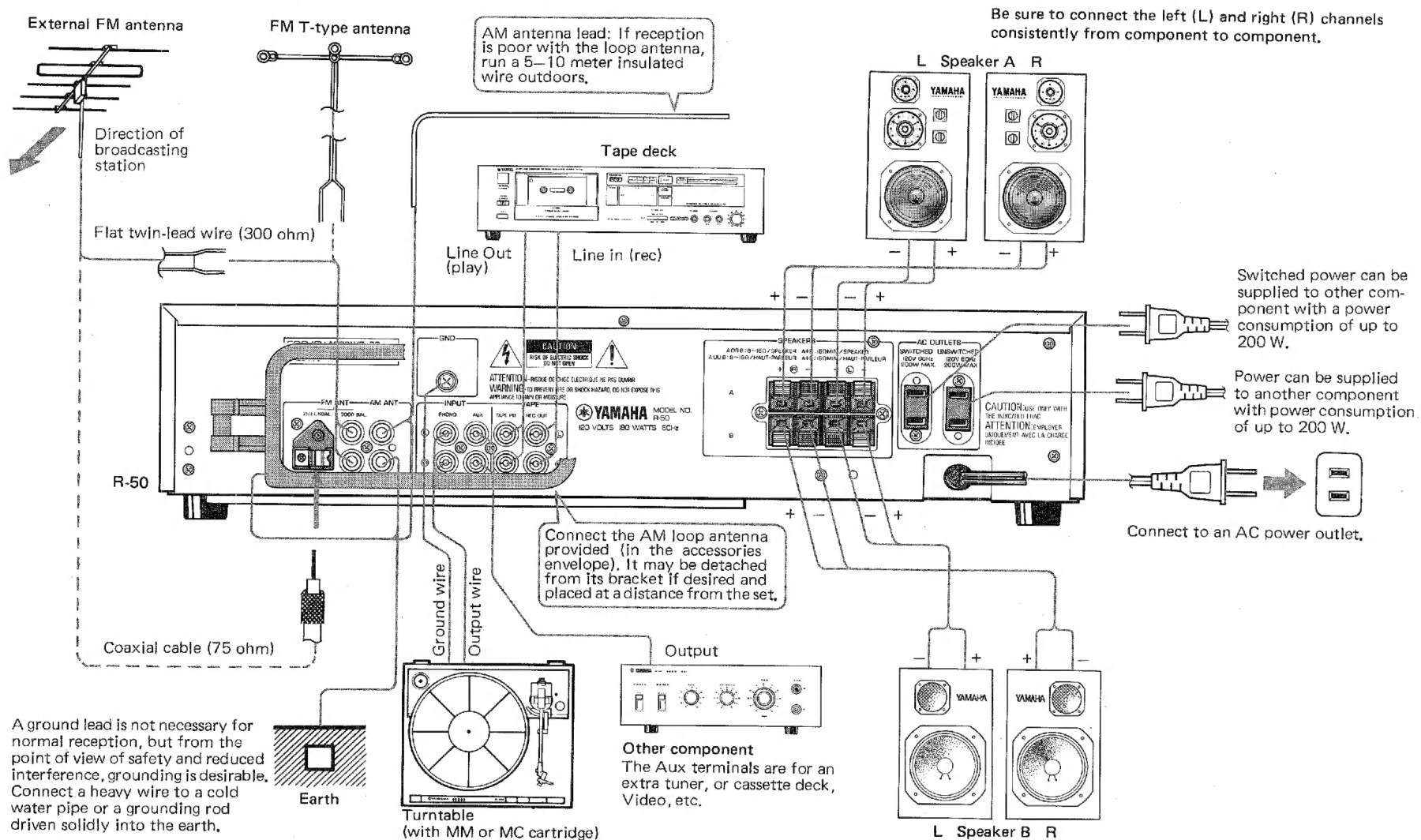
Be sure to read the "troubleshooting" section for advice on common operating errors before concluding that your R-50 is faulty.

17

Keep this manual in a safe place for future reference.

R-50

CONNECTION DIAGRAM



CONNECTIONS

■ CONNECTING THE SPEAKERS

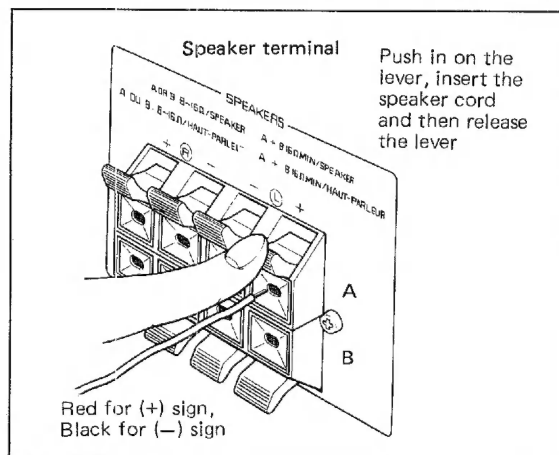
The matching impedance of this amplifier is 8 ohms.

Either one or two pairs of speakers may be connected. If only one pair is connected the recommended speaker impedance may be anywhere between 4 and 16 ohms. If two pairs are connected, however, it is advisable to use speakers with at least an 8 ohm impedance for optimum performance.

Connecting two pairs of 4 ohm speakers is not recommended.

Connect the cords going to the left speakers to the L terminals and the right speaker cords to the R terminals, making sure that the "+" and "-" marking are observed. If the "+" and "-" wires are reversed at either speaker, the sound will be unnatural and will lack bass. Speaker cords should be cut as short as possible; do not coil up excess wire on the floor. Also, do not bundle with cords from other system components.

Push in one the lever at the terminal, insert the exposed wire of the speaker cord into the hole and then release the lever. The cord will be locked into position. If these connections are faulty, no sound will be heard from the speakers..

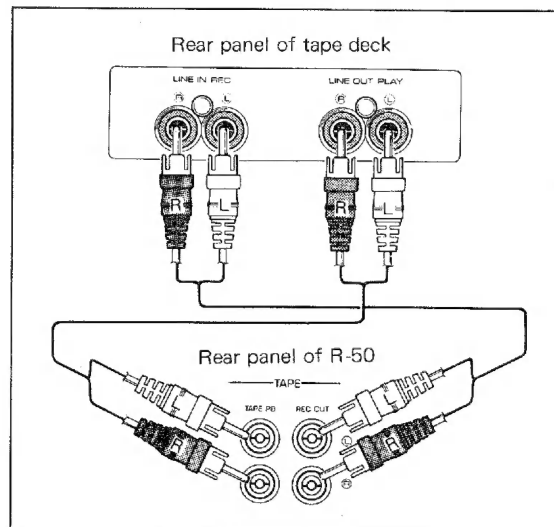


■ CONNECTING A TURNTABLE

Connect the output cords of the turntable to the receiver's Phono Jacks, and connect the ground wire to the Gnd terminal. Normally, connecting the ground wire produces minimum hum, but in some cases better results are obtained with the ground wire disconnected. The cartridge and the turntable's output cords should be positioned well away from such sources of hum as power cords or power transformers of other system components.

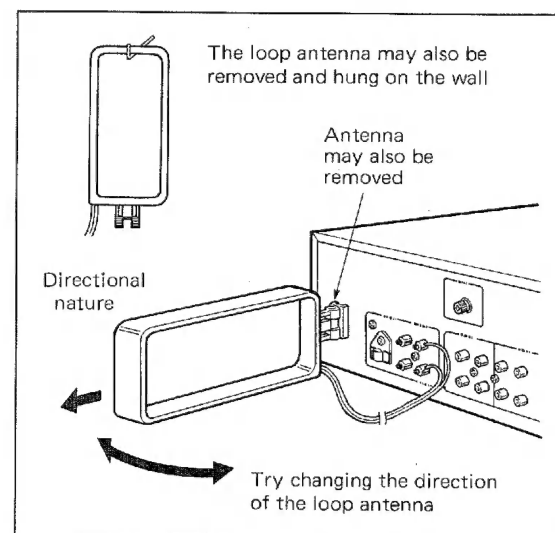
■ CONNECTING A TAPE DECK

Connect the Tape PB jacks to the tape deck's Line Out jacks, and the Rec Out jacks to the tape deck's Line In jacks.



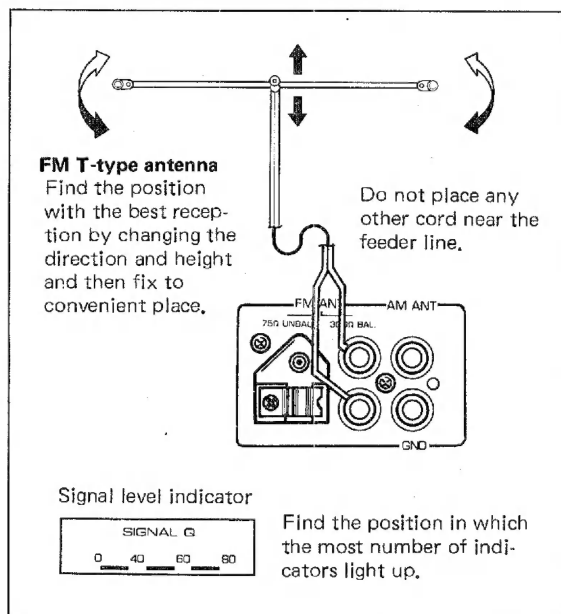
■ CONNECTING THE AM ANTENNA

In many cases it will be possible to get excellent AM reception with the provided AM loop antenna. Attach the antenna leads to the Gnd and AM Ant terminals and rotate the antenna in its bracket for best reception. The loop antenna may also be removed and hung on the wall. If necessary, an outdoor antenna may be used for improved AM reception. Connect a 5-10 meter length of insulated wire to the AM Ant terminal and run it outdoors.



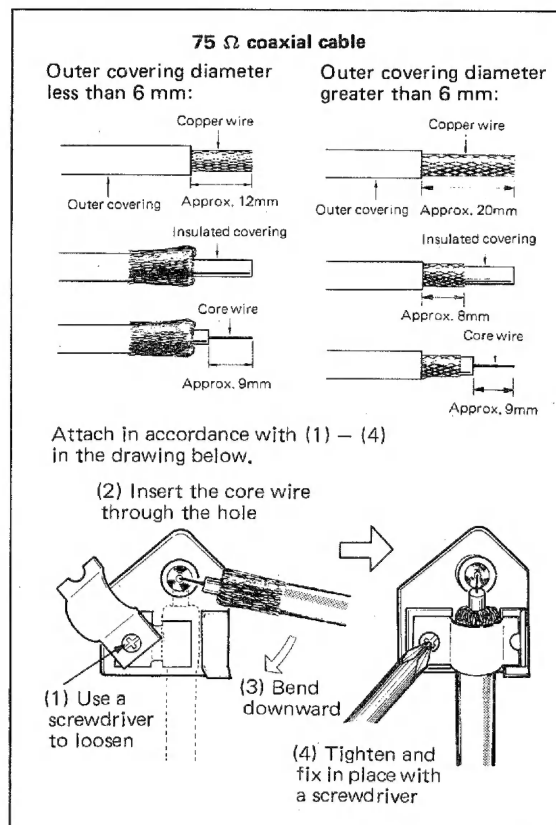
■ CONNECTING THE FM ANTENNA

Choose an FM antenna that is appropriate to the local reception conditions. Consider the distance from the broadcast station and possible interfering objects such as surrounding tall buildings. In cases where there is a strong signal from a local station, a portable T-type antenna is usually adequate. Connect the feeder wire to the 300 ohm terminal, stretch the wire out tight, and turn to obtain optimum reception. Attach to a suitable support such as a wall.



In all but the best reception conditions, an outdoor FM antenna is necessary for best results. Either 300 ohm flat twin-lead wire or 75 ohm coaxial cable may be used. In locations where electrical interference is a problem, coaxial cable is preferable. Refer to figure for instructions on installing the coaxial cable.

Note: Connect either an indoor FM T-type antenna or an outdoor FM antenna but not both.

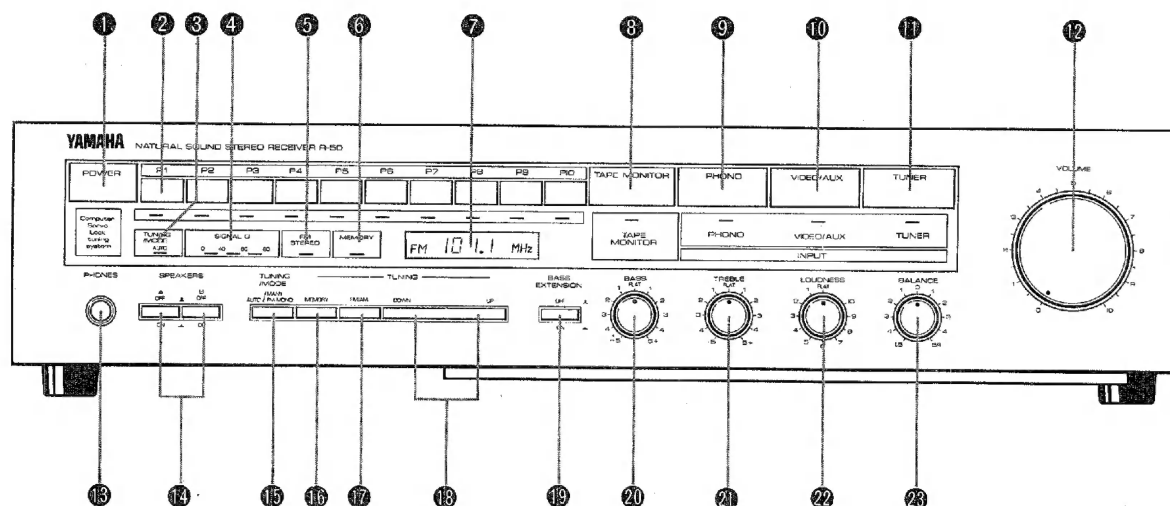


■ AC OUTLETS

Provided for connecting other audio equipment. The left outlet, with a maximum power capacity of 200 W, is switched on and off by the receiver's power switch; the right outlet supplies continuous unswitched power up to a maximum of 200 W.

*

FRONT PANEL PARTS AND FUNCTIONS



① POWER SWITCH

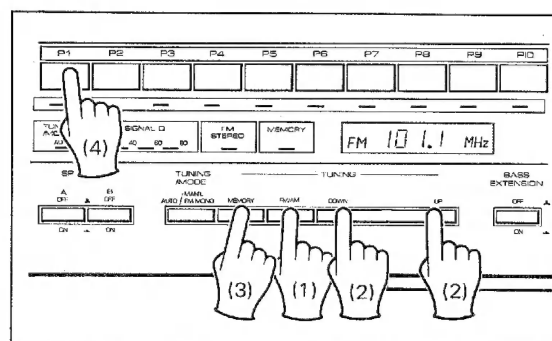
This is a "push-on, push-off" power switch. When power is turned on, the digital frequency display and other relevant indicators will light.

- The tuner input source will be selected.

② PRESET TUNING BUTTONS

10 FM and AM stations can be preset. First tune in the station you want to preset. Then push the Memory button. The Memory LED will glow continuously. While it is lit, push one of the preset buttons. The LED beneath it will light. Thereafter, whenever that button is pushed, the preset station will be immediately tuned in. Each of the buttons can be used to preset one AM or one FM station.

- When the Memory button is pushed, the LED beneath the last button which was preset will flash, so you should push the next button.
- It is not necessary to select the proper band (FM or AM) before using one of the preset buttons to tune in a station. The band is memorized together with the station. The tuning mode (Auto Stereo or Mono) is also memorized.



③ TUNING/MODE AUTO INDICATOR

Lights to show that the tuner is in the automatic search tuning mode and automatic stereo mode.

④ SIGNAL QUALITY INDICATION

These three indicators show the relative strength of the received station.

⑤ FM STEREO INDICATOR

Indicates when the received FM station is in stereo. Does not light when tuner is in mono mode.

⑥ MEMORY

When the Memory button is pushed, this LED lights to indicate that one of the preset buttons should be pushed.

⑦ DIGITAL FREQUENCY READOUT

Displays tuner frequency and band (AM – kHz or FM – MHz).

⑧ TAPE MONITOR

Depress this switch to listen to the sound from the tape recorder. The red LED beneath it will light.

⑨ PHONO

Depress this switch to listen to the turntable. The green LED will light.

⑩ VIDEO/AUX

Depress this switch to listen to an auxiliary sound source—an extra tape deck or tuner (not turntable), video deck, DAD (Digital Audio Disc) player etc. The green LED will light.

⑪ TUNER

Depress this switch to listen to the tuner. The green LED will light.

⑫ VOLUME

Used to adjust overall sound volume.

⑬ PHONES JACK

Used for plugging in headphones. When you want to listen to headphones only, speaker switches A and B should both be in the off position.

⑭ SPEAKER SELECTORS

With these switches you can select either or both of two pairs of speakers. The in position is the on position.

⑮ TUNING MODE SELECTOR

In the Auto mode, the tuner will automatically scan the frequency band when the Up or Down side of the tuning button is pushed, and the Auto LED indicator (3) will light up. In the Manual mode, the tuner will advance one step at a time when the tuning button is pushed once, and continuously when it is pushed continuously. In addition, when set to the Auto position, any stereo FM broadcast will be received in stereo. If the station is weak, however, and interference is heard, setting the selector to the Mono position will help to bring the station in clearer—without, of course, the stereo effect.

⑯ MEMORY

As explained above under ②, pushing this button allows a station to be preset into the memory.

⑰ FM AND AM SELECTORS

Push to select FM or AM. The selected band will be indicated next to the digital frequency display.

⑱ TUNING

This button is used to scan the FM or AM band for stations. In the Auto mode, pushing the Up side of the button causes the tuner to scan to progressively higher frequencies until a station is found and then to lock the station in. Pushing the Down side causes it to scan down the band. If the end of the band is reached without finding a station, the auto-search circuit instantly shifts to the opposite end of the band and the search continues in the same direction. In the Man'l mode, pushing the tuning button once will cause the tuner to move one step in the up or down direction (one step equals 0.1 MHz in FM and 10 kHz in AM). Pushing continuously will cause the tuner to scan continuously.

- * Push the button firmly on one end or the other, not in the middle.
- * This tuner incorporates a last station memory. When turned on, it will tune to the last station that was tuned in before it was turned off.

⑲ BASS EXTENSION

Pushing this button in boosts the bass range. Can be used to compensate for speakers with weak bass or for a listening environment which deadens the bass.

⑳ BASS CONTROL

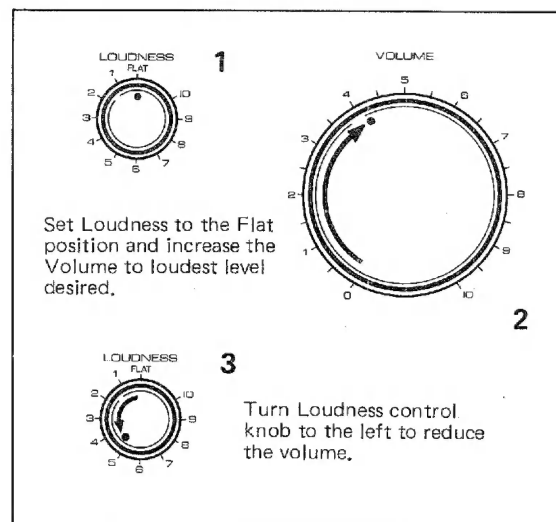
Lets you adjust bass response. The center, detented, Flat position is for normal response.

㉑ TREBLE CONTROL

Lets you adjust treble response. The center, detented, Flat position is for normal response.

㉒ LOUDNESS CONTROL

Compensates for our ears' reduced sensitivity to the extreme high and low frequencies at low volumes. Set it to the Flat position with the Volume control set to the loudest level at which you listen. Then, when you want to listen at lower volume levels, rotate the Loudness control to the left instead of using the Volume control. This will retain the natural balance of the high and low frequencies.



㉓ BALANCE CONTROL

Used to adjust the relative volume of the left and right speakers. You can thus compensate for imbalances caused by speaker placement, room furniture, or your listening position.

LISTENING TO A PROGRAM SOURCE

■ LISTENING TO FM BROADCASTS

1. Set the Input selector to Tuner.
2. Set the FM and AM Selectors to FM.
3. Set the Tuning/Mode switch to Auto.
4. Press either the Up or the Down side of the Tuning button. The receiver will automatically scan the FM band in the selected direction. When a station is found, the scan will stop and the station will be locked in automatically. Use the Tuning button repeatedly to tune in your desired station. Stations may also be selected with the preset tuning buttons.
5. When the station is in stereo the FM Stereo indicator will light, while for mono stations the indicator will remain off.
- When listening to a weak, distant station or when there is interference from another station, setting the Tuning/Mode switch to the mono position will cause the station to be received in mono and considerably reduce noise.
6. Adjust the volume, tone, balance, and loudness levels to your preference.

■ LISTENING TO AM BROADCASTS

1. Set the Input selector to Tuner.
2. Set the FM and AM Selectors to AM.
3. Set the Tuning/Mode switch to Auto.
4. Press either the Up or the Down side of the Tuning button. The receiver will automatically scan the AM band in the selected direction. When a station is found, the scan will stop and the station will be locked in automatically. Use the Tuning button repeatedly to tune in your desired station. Stations may also be selected with the preset tuning buttons.
5. Adjust the volume, tone, balance, and loudness levels to your preference.

■ LISTENING TO RECORDS

1. Set the Input selector to Phono.
2. If your turntable is equipped with an MM cartridge it can be connected directly to the receiver, but if an MC cartridge is used an MC cartridge head amp or a step-up transformer will be necessary.
3. Place a record on the turntable and start it playing.
4. Adjust the volume, tone, balance, and loudness levels to your preference.
- When lowering the stylus to the record or raising the stylus from the record, turn the volume control all the way to "0".

■ RECORDING TAPES

1. Select the source to be recorded (Phono, Video/Aux, or Tuner).
2. Start the music from the selected source.
3. Set the recording level, etc. of the tape deck, and begin recording.
4. If your tape deck has three heads, pushing the Tape Monitor button will allow you to monitor the recorded material.
- Adjusting the tone controls (Bass, Treble) or the volume control during recording has no effect on the material being recorded.

■ PLAYING BACK TAPES

1. Push the Tape Monitor button.
2. Set the tape deck to Play.
3. Adjust the volume, tone, balance, and loudness levels to your preference.

■ PRESET TUNING

In addition to the auto-search tuning feature, a convenient programmable preset tuning system allows you to tune in your favorite stations with the touch of a button. To preset a station into the memory, first tune the station in. After pressing the Memory button, press one of the numbered preset tuning buttons. The tuner will then memorize the station's frequency. Any time the appropriate numbered button is pressed, the station will be automatically tuned in. After you have preset a station, it is a good idea to manually change to another frequency and then push the newly memorized station's button again to see that it is tuned in correctly. Up to 10 stations can be preset — 10 AM, 10 FM, or any combination of AM and FM. The band is memorized together with the station. To tune in a previously memorized station, press the numbered button corresponding to the desired station. The station will be automatically tuned in. The preset tuning button will light to indicate automatic station selection. There may be cases where static electricity or electrical noise from fluorescent lamps or television sets prevents successful preset tuning. Set the tuner away from such sources of interference.

SPECIFICATIONS

AUDIO SECTION

Minimum RMS Output Power per Channel

8 ohms, 20 Hz to 20 kHz, 0.015% THD	35 W
4 ohms, 1 kHz, IHF Signal (Dynamic Power)	60 W
2 ohms, 1 kHz, IHF Signal (Dynamic Power)	70 W

Dynamic Headroom

(IHF, 8 ohms)	1.8 dB
---------------	--------

Power Bandwidth

8 ohms, 0.02% THD, Half Rated Power	10 Hz to 30 kHz
--	-----------------

Damping Factor

(8 ohms, 1 kHz)	49
-----------------	----

Input Sensitivity/Impedance

Phono	2.5 mV/47 k-ohms
Aux/Tape/Tuner	120 mV/42 k-ohms

Input Sensitivity (New IHF)

Phono	0.42 mV
Aux/Tape/Tuner	20 mV

Maximum Input Level

(1 kHz, 0.01% THD) Phono	85 mV
-----------------------------	-------

Output Level/Impedance

Rec Out	120 mV/1 k-ohm
---------	----------------

Headphone Output/Impedance

(0.015% THD)	0.59 V/220 ohms
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Frequency Response

Aux/Tape/Tuner (20 Hz to 100 kHz)	-3 dB
--------------------------------------	-------

RIAA Deviation

Phono	±0.5 dB
-------	---------

Total Harmonic Distortion (20 Hz to 20 kHz)

Phono to Rec Out (1 V)	0.015%
Aux/Tape/Tuner to Sp Out (1 W/8 ohms)	0.008%

Intermodulation Distortion

Aux/Tape/Tuner (Rated Power/8 ohms)	0.01%
--	-------

Signal-to-Noise Ratio (IHF A Network)

Phono (5 mV, Input Shorted)	88 dB
Aux/Tape/Tuner (AM position, Input Shorted)	97 dB

Signal-to-Noise Ratio (New IHF)

Phono	73 dB
Aux/Tape/Tuner (AM Position)	79 dB

Residual Noise (IHF A Network)

(IHF A Network)	175 µV
-----------------	--------

Channel Separation (1 kHz)

Phono (Input Shorted)	60 dB
Aux/Tape (5.1 k-ohms Shorted)	60 dB

Tone Control Characteristics

Bass (boost/cut)	±10 dB (50 Hz)
Treble (boost/cut)	±10 dB (20 kHz)
Bass Extension	+8 dB (62 Hz)

Filter Characteristics

Low (Subsonic, Built-In)	15 Hz — 12 dB/oct.
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Continuous Loudness Control

(Level-Related Equalization) Max. Attenuation	-20 dB at 1 kHz
--	-----------------

FM SECTION

Tuning Range

87.5 to 108.0 MHz	
-------------------	--

50 dB Quieting Sensitivity (IHF, 75 ohms)

Mono	1.6 µV (15.3 dBf)
Stereo	22 µV (38.1 dBf)

Usable Sensitivity

(30 dB Quieting, 75-ohms, Mono)	0.8 µV (9.3 dBf)
------------------------------------	------------------

Image Response Ratio

	50 dB
--	-------

IF Response Ratio

	90 dB
--	-------

Spurious Response Ratio

	70 dB
--	-------

AM Suppression Ratio

	60 dB
--	-------

Capture Ratio

	1.5 dB
--	--------

Alternate Channel Selectivity

(IHF)	55 dB
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Signal-to-Noise Ratio (IHF)

Mono	85 dB
Stereo	81 dB

Harmonic Distortion

Mono	100 Hz	0.07%
	1 kHz	0.1%
	6 kHz	0.15%
Stereo	100 Hz	0.15%
	1 kHz	0.15%
	6 kHz	0.2%

Stereo Separation (IHF)

50 Hz	40 dB
1 kHz	40 dB
10 kHz	40 dB

Frequency Response

30 Hz to 15 kHz	±0.5 1.5 dB
-----------------	----------------

Subcarrier Product Ratio

	45 dB
--	-------

AM SECTION

Tuning Range

510 kHz to 1,620 kHz	
----------------------	--

Usable Sensitivity

250 µV/m	
----------	--

Selectivity

25 dB	
-------	--

Signal-to-Noise Ratio

52 dB	
-------	--

Image Response Ratio

40 dB	
-------	--

Spurious Response Ratio

50 dB	
-------	--

Distortion (400 Hz)

0.3%	
------	--

Output Level/Impedance (REC OUT)

FM 100% mod. 1 kHz	500 mV/5 k-ohms
AM 30% mod. 400 Hz	150 mV/5 k-ohms

GENERAL

Power Supply

120 V/60 Hz	
-------------	--

Power Consumption

180 W	
-------	--

AC Outlet

Switched	200 W max.
Unswitched	200 W max.

Dimensions (W x H x D)

435 x 102 x 347.7 mm (17-1/8 x 4 x 13-11/16")	
--	--

Weight

6.5 kg (14 lbs. 5 oz.)	
------------------------	--

Specifications subject to change without notice.

TROUBLESHOOTING

Before assuming that your receiver is faulty, check the following troubleshooting list which details the corrective action you can take yourself without having to call a service engineer. If you have any doubts or questions, get in touch with your nearest Yamaha dealer.

	FAULT	CAUSE	CURE
AUDIO	Power is not applied even though the Power switch is turned on.	The power cord is not plugged in.	Plug in the power cord.
	There is no sound with any position of the Input selector.	The Speaker switches are not set correctly.	Set them correctly.
		The input cords are not connected securely.	Plug them in securely.
	There is no sound from one speaker.	The speaker connections are not secure.	Secure the connections.
		The Balance control is set all the way to the left or right.	Adjust the Balance control correctly.
	There is a lack of bass and no ambience.	The + and - cords have been reversed at the amp or the speakers.	Connect the speaker wires in the correct phase (+ and -).
	There is a humming sound when playing records.	The input cords are not connected securely.	Plug the input cords in securely.
		The turntable's ground wire is not connected.	Connect the ground wire.
	There is a howling sound when playing records at high volume.	The turntable and the speakers are too close together or the turntable is not mounted on a firm surface.	Change the location of the turntable or the speakers.
FM	Crackling sounds from time to time (especially in weak signal areas).	Ignition noise from vehicles.	The FM antenna should be put up as high as possible, away from the road, and a coaxial cable used.
		Noise from thermostats and other electrical equipment.	Attach a noise suppressor to the equipment causing the noise.
	FM stereo reception is noisy.	Because of the characteristics of FM stereo broadcasts, this is limited to cases where the transmitter is far away or the antenna input is poor.	Check the antenna connections.
			Try using a multiple element FM antenna.
	The FM Stereo indicator flickers on and off and reception is noisy.	Insufficient antenna input.	Set the Tuning/Mode switch to the FM Mono position.
			Use an antenna appropriate for the reception conditions in your area.
	There is distortion and clear reception cannot be obtained even with a good FM antenna.	Not tuned correctly.	Tune again.
	There is distortion and clear reception cannot be obtained even with a good FM antenna.	There is multipath interference.	Adjust antenna placement to eliminate multipath interference.
AM	No stereo effect even with a stereo broadcast.	The Tuning/Mode switch is set to FM mono.	Set this switch to the Auto position.
	A desired station can not be tuned in with Auto Tuning.	The station is too weak.	Use a high-quality directional FM antenna.
	Previously preset stations can no longer be tuned in.	The tuner has been unplugged for a long period.	Repeat the preset procedure.
	Insufficient sensitivity.	Weak signal or loose antenna connections.	Tighten the AM loop antenna connections and rotate it for best reception.
			Use an outdoor antenna.
	There are continuous crackling and hissing noises.	These noises result from lightning, fluorescent lamps, motors, thermostats and other electrical equipment.	Use an outdoor antenna and a ground wire. This will help somewhat but it is difficult to eliminate all noise.
		Another station is interfering with the received station.	This is impossible to remedy.
	There are buzzing and whining noises.	A television set is being used nearby.	Move the television a distance away.

SINCE 1887



YAMAHA

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